



Materials Engineering Branch

TIP*



No. 024 Catastrophic Failure of High Strength Steels

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High strength steels of the quenched and tempered low alloy variety are subject to several phenomena that can lead to catastrophic or sudden failure. Such steels are 4130, 4340, and H-11. If heat-treated to high strength levels, over 200 ksi, they can fail by means of stress corrosion cracking, notch sensitivity or hydrogen embrittlement.

Therefore, the applied stress levels should be kept below the threshold stress value, and hydrogen embrittlement stress relief heat treatment should be conducted on the steel component immediately following any hydrogen-producing process, such as electroplating or pickling. Any application that is to employ such susceptible alloys at high strength levels should be preceded by a thorough study of the literature to determine what procedures should be followed to avoid sudden failure.

To avoid problems associated with stress corrosion cracking with these and other low alloy steels, the reader is referred to NASA-STD-6004 titled "Guidelines for the Selection of Metallic Materials for Stress Corrosion Cracking Resistance in Sodium Chloride Environments".